DOCUMENT RESUME

ED 060 943 PS 005 466

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TITLE Prekindergarten Program Evaluation. Summer, 1971.
INSTITUTION Atlanta Public Schools, Ga.
PUB DATE 71
NOTE 46p.
JOURNAL CIT Research and Development Report; v5 n3 Summer 1971

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Academic Achievement; Behavioral Science Research; *Behavior Change; *Comparative Analysis; Concept Formation; Educational Programs; Emotional Development; Individual Development; Laboratory Techniques; Measurement Instruments; *Preschool Children; *Program Evaluation; Projects; Public Schools; *Reading Programs; School Systems; Teacher Attitudes; Universities
IDENTIFIERS *Atlanta Public School System; Elementary and Secondary Education Act Title 1; Georgia State University

ABSTRACT

The Atlanta Public School System conducted four major programs during the summer of 1971. These were Youth-Tutoring-Youth, Community Schools, Handicapped Children, and Prekindergarten Instruction. Evaluation of the Prekindergarten (Pre-K) project was contracted to the Laboratory for Applied Behavior Research at Georgia State University. The Laboratory agreed to: (1) provide consultants to assist in the implementation of behavior modification techniques for use with two basic reading programs utilized in the Pre-K classes, (2) evaluate the use of each reading program in the Pre-K classrooms, irrespective of the program's association with behavior modification procedures, (3) describe the overall academic activities of the Pre-K classes, and (4) suggest specific changes for future Pre-K projects. The BRL Skills and Concepts Survey was used as the evaluation instrument for this program. After the pre-program measures were taken, the children were divided into two groups: (1) those whom the teacher considered emotionally, behaviorally, and intellectually ready for the BRL reading program, and (2) those whom she considered too young or otherwise not adequately prepared for the BRL format. A main result of this study was the finding that the BRL reading program is superior to others. (Author/CK)

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R E S E A R C H A N D D E V E L O P M E N T R E P O R T

Vol. V, No. 3 Summer, 1971

PREKINDERGARTEN PROGRAM EVALUATION

SUMMER, 1971

Funded Under ESEA Title I, P. L. 89-10

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PS 005466

ACKNOWLEDGMENTS

The authors wish to express appreciation to all the teachers involved in the Summer Prekindergarten Program, especially to Ms. Helen Fitzgerald and Ms. Sarah Singley, both of whom worked closely with the consultants.

Special thanks are expressed to Ms. Betty Fromhagen for her voluntary help with the REBUS program at E. S. Cook Elementary School.

Hereafter fictitious names have been used for classroom teachers.

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Prekindergarten Project Evaluation

Summer, 1971

INTRODUCTION

The Atlanta Public School System, operating with monies received from the Federal Government (Public Law 89-10, Title I), conducted four major programs during the summer of 1971. Those programs were Youth-Tutoring-Youth, Community Schools, Handicapped Children, and Prekindergarten Instruction.[1] Evaluation of the Prekindergarten (Pre-K) project was contracted to the Laboratory for Applied Behavior Research at Georgia State University. The Laboratory agreed to:

1. Provide consultants to assist in the implementation of behavior modification techniques for use with two basic reading programs utilized in the Pre-K classes.
2. Evaluate the use of each reading program in the Pre-K classrooms, irrespective of the program's association with behavior modification procedures.
3. Describe the overall academic activities of the Pre-K classes.
4. Suggest specific changes for future Pre-K projects.

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[1] A description of each of the four programs may be found in "Application for Federal Assistance for the Education of Children from Low-Income Families for Fiscal Year 1971." Atlanta Board of Education; April 30, 1971.

Pre-K classrooms were established at nine Title I elementary schools in the Atlanta area. These schools were Cook, Grant Park Primary, Harris, M.A. Jones, Luckie, Pitts, Slater, Ware, and Williams. All of the schools were chosen because they were located in lower socio-economic areas. In addition, two of the schools were associated with large public housing projects- Pitts with Perry Homes and Williams with Bowen Homes. Projected enrollment was thirty children at each of the nine schools giving a total of two hundred and seventy children in the Pre-K program.

Program activities for the children began on June 21, 1971 and ended July 30, 1971. The children spent a total of six weeks (twenty-nine days) in the program. The teachers, in addition to the six weeks spent working with the children, underwent one week pre-service and post-service sessions.

A major objective of the Pre-K program, as stated in the original proposal,[2] was "To provide a structured readiness program designed to develop the pre-reading skills of Pre-Kindergarten pupils, and first grade pupils who have not had kindergarten experience." In order to facilitate the attainment of this objective, two fully developed programs for the teaching of reading were selected for use in the Pre-K classrooms.

The first of these programs was Behavior Research Laboratory's Sullivan Reading Program (BRL). The BRL program was used by classes at Grant Park Primary, M. A. Jones, Luckie, and Slater schools. Teachers at M. A. Jones, Luckie, and Slater simply followed the workbook for the BRL program, while the teachers at Grant Park Primary used the BRL materials in conjunction with specific behavioral techniques designed to increase the efficiency of teaching Pre-K children. Ms. Kathleen Kelly was the consultant to Grant Park Primary.

The second program selected for use in Pre-K classes was the Peabody Rebus Reading program. The Rebus was used at Cook, Harris, Pitts, and Ware schools. As with the BRL program, teachers at three of the Rebus schools (Harris, Pitts,and Ware) simply integrated the Rebus program into their regular classroom activities, while the teacher at Cook used the program in conjunction with specific behavioral techniques. Mr. George O'Neill was the consultant to Cook school.

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[2] Ibid.

Teachers at Williams school used neither the BRL nor the Rebus materials to teach pre-reading skills to the children. Rather they relied on what was termed an "eclectic" approach. This approach concentrated on exposing the children to a large number of concepts (e.g. colors, sizes, space relations) in a variety of different situations throughout the course of the Pre-K program. Pupils at Williams school were used as controls for the BRL program.

The following two sections describe the use of the BRL and Rebus programs in the Pre-K classes. Within each section the same format will be followed. First, the program will be fully described. Second, the use of that program in the behavior modification school will be explained. Third, the program's use in the other schools will be described. Fourth, a comparison of the program's use with and without behavior modification will be given.

The last section of the report deals with other academic activities used in the Pre-K classes. Differences in teacher approach, the setting and meeting of objectives, and suggestions for change will be discussed.

THE BRL-SULLIVAN PROGRAM

Description of the BRL Program

The Sullivan reading program is a product of the Behavior Research Laboratories in Palo Alto, California. This programmed reading series is designed so that after initial teacher-directed phases, the child may proceed to work at his own pace. The authors of this series have attempted to arrange reading material so that the user is shaped into making responses at a very high rate of accuracy. Motivated by this success, the child's interest is maintained and new components of reading, at increasing levels of complexity, are gradually introduced. The Sullivan program, then, is designed to produce a condition of "errorless learning" in reading.

"Readiness in Language Arts" is the first stage in the Sullivan reading series and was the only level used in this program. The format consists of an imaginary trip taken by several animals where shapes, letters, and colors are introduced. As the animals in the book make these discoveries, the children are learning, too, and, by the end of the book, can read a limited number of letters. This level of the reading series is teacher-directed and the children's responses are oral. Materials used include the large, black-board size book with an easel stand and the teacher's manual. Each step is clearly directed with page by page instructions for the teacher.

BRL Program With Behavior Modification

Subjects. Twenty-two children originally registered for the Summer Pre-K Program. Fourteen children completed at least 15 days of the program. The age of those children completing the program ranged from 4 to 6 years for an average of 4.8 years of age. The remaining eight children attended from one to six days before withdrawing from the program.

Setting. One of the regular kindergarten classrooms in the Grant Park Primary School was used for this study. Equipment in the room consisted of 4 child-size tables with chairs, a listening station with headphones for 6 children, a play kitchen, a block-building area, and an artist's easel for painting.

Additional facilities in the school consisted of a large play area for rainy day activities, the school playground, and a cafeteria eating area.

Personnel. One regular kindergarten teacher and one aide were present during the 6-week program. Four Atlanta Area Teachers Educational Service (AATES) teachers were in the classroom for two weeks each during the study. In addition, the school nurse assisted the teacher and served as an additional aide throughout the course of the program.

Mrs. Cunningham, the classroom teacher, took a personal interest in each child. The aide and the school nurse shared her enthusiasm and the three together conducted a well-coordinated program. Having two additional adults in the classroom (each team of AATES teachers for 2 weeks) required special arrangements. The first pair of AATES teachers worked very well in the class; the second pair, however, often arrived after 9:00 a.m. The exact function of the AATES teachers was not made clear; part of the time they served as participants, but at other times they were simply observers.

Program Evaluation. The BRL Skills and Concepts Survey was used as the evaluation instrument for this program. All 12 children present during the first week of the program were given the survey checklist. Post-program measures were taken for those same children only. Thus, any children not entering during the first week of the program were not considered in the evaluation. Survey checklists were administered and evaluated by program consultants. The teachers had no information regarding items on the survey until after the program had been completed.

Procedures. After the pre-program measures were taken, the children were divided into 2 groups: 1) those whom the teacher considered emotionally, behaviorally, and intellectually ready for the BRL reading program, and 2) those whom she considered too young or otherwise not adequately prepared for the BRL format. Each of these groups followed the regular class schedule in all activities except for a 15 minute period each day when their particular intervention took place.

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BRL Reading Group. Directed by Mrs. Cunningham, this group consisted of seven children whose average age was 5.3 years. The standard BRL procedures were followed as directed by the teacher's manual. The teacher used primary reinforcement in the form of pre-sweetened cereal on an intermittent basis. Thus, she gave this form of reinforcement not after each correct response, but rather after the child had made several correct responses. This schedule was followed in order that the child not become dependent upon the primary reinforcer for every response. Further, intermittent delivery of the reinforcement results in much longer responding when the primary reinforcement is faded out. Social reinforcement, however, was delivered almost continuously for correct answers; this included smiles, hugs, and praise by the teacher.

In an effort to facilitate the left-right discrimination, each child in this group wore a red ribbon on his left wrist, the same color as is used in the large book for "left side of the page." The seven children were divided into 2 groups of 3 to 4 children each. Both groups met regularly each day for the fifteen minute period. While one group was engaging in the BRL activity, the other group would be with one of the aides in another area of the room. At the end of the session, the two groups would switch places and the second group would participate in the BRL program.

Non-BRL Group. Six children who were considered unprepared for the formal BRL reading program comprised the second group in this study. The average age was 4.2 years. An aide, assisted by the program consultant, conducted this group for 15 minutes each day. In an attempt to evaluate the BRL program from a different direction, the following format was designed. The stated objectives of the BRL program, on the level used by the first group, were outlined into four categories as discussed below. The question was asked: Could these objectives be taught directly to the children, by-passing the BRL format? In order to evaluate these procedures, each child was exposed to all four categories daily. Five presentations were made from each category so that the child had 20 possible correct responses each day. The four major groups of BRL objectives were as follows:

1. Concepts: Left, right, top, middle, bottom. (Aide: "Which hand is this?" "Where on the card is this shape,"etc.)
2. Numbers: 1-6 (Aide used 3" x 5" cards with one to six objects printed on card. Aide: "How many [objects] do you see?")

3. Color: Red, green, blue, yellow, black, white, green, orange, brown. (Aide: "What color is this?")

4. Shapes: Triangle, square, circle. (Aide used cardboard shapes. Aide: "What shape is this?")

A daily record was kept of each child's responses to the 20 stimulus items presented by the aide. Additional items had to be included in the concept and colors categories on Day 2 of the study. The children were responding at a level of 60% to 75% accuracy and it was decided that the stimulus items were too simple.

The original design for this non-BRL intervention was the multiple baseline technique. After stable measures had been gotten on all four behaviors, one of the four categories would utilize reinforcement for correct responses. After this category had demonstrated the effect of reinforcement on correct rate of responding, a second behavior would also be reinforced. The two remaining behaviors would remain a baseline state until successively reinforced. It was found, however, that the repeated presentations of the stimuli alone were sufficient to increase performance rate. It is possible that systematically organizing the material into concise form and then regularly exposing the children to the material can effect performance increases not found in less direct presentations. The revised intervention, then, was to systematically present the material with no extrinsic reinforcement.

If a child answered correctly, the aide answered, "That's correct, (name of child)." If the child answered incorrectly, the aide responded, "No (name of child),this color is red," or whatever the correct response should have been.

One child in this group, David, began to display tantrums and balking behaviors during session 3 of the intervention. It was decided to utilize intermittent primary reinforcement for him only. Beginning with his next session and until the completion of the study, David received primary reinforcement and praise for his correct responses. He worked apart from the group beginning with Session 3.

Other Behavioral Interventions. In addition to the efforts directed specifically toward pre-reading skills, several other suggestions made by the behavioral consultant were carried out by the teacher. A standard kitchen timer was used to facilitate movement from one activity to another. Before each activity was completed, the teacher and aides would instruct the children where to go next. If they went promptly to the assigned activity area and were settled down before the timer rang, she would intermittently deliver a small amount of primary reinforcement (sweetened cereal). She would also assign the status roles (first in line, message carrier, etc.) to those children who followed her directions most quickly in various activities. This included participation, cooperating with another child, paying attention, and so on.

The results from this classroom, then, are the interaction of two important variables: 1) the BRL reading program and 2) behavior modification techniques. The data will be effected by both of these agents of change and the effects of each cannot be separated within the scope of this study. One alternative to this analysis problem would be to compare the results of the BRL-Behavior Modification classroom with other BRL classrooms not using behavioral techniques. What follows is a description of these classes.

BRL-Sullivan Program Without Behavior Modification

In addition to its use at Grant Park Primary the BRL program was also used at Jones, Luckie, and Slater schools. Teachers at these schools were not given any specific instructions as to how to run the program in their individual classrooms. As a consequence, the use of the BRL materials varied greatly from class to class. Rather than attempt to describe the classes as an aggregate, each teacher's use of the BRL will be dealt with separately. In each case, the description of procedures is based upon random visits paid to the schools by an evaluator from the Laboratory for Applied Behavior Research. Evaluation visits were randomly scheduled and the evaluator arrived unannounced at each location. Usually about three hours were spent at each school during each visit. In addition to evaluation visits, each BRL Pre-K classroom was pre-tested and post-tested using a questionnaire based upon the BRL-Sullivan Skills and Concepts Survey kit. (The nature of this test and the results associated with its use will be described fully in a later section.)

M. A. Jones. The Pre-K class at this school was under the direction of Mrs. Smith. She was assisted throughout the six weeks by a variety of personnel including AATES interns, aides, parents, and NYC workers. The total enrollment at M. A. Jones was thirty-one children. Of these thirty-one, twenty-seven attended more than fifteen days.

The first evaluation visit was paid to M. A. Jones on July 6, 1971. Due to the low attendance following the fourth of July weekend (N=14 of 31) and the fact that the children were undergoing eye tests, no BRL activities were conducted on this date. Mrs. Smith reported that the BRL program was normally conducted from 10:00 a.m. to 10:50 a.m. each day. Several small groups of children (from 5-7 children in each group) were rotated through a variety of activities during this period. These activities were the BRL materials, lotto games, pegboards, and art. The average amount of time spent in a particular activity was about 15 minutes according to Mrs. Smith.

The second evaluation visit was made on July 15, 1971. Three groups of children (N=6, 7, and 8) were exposed to the BRL materials. Each group spent 15 minutes at the BRL activity, which was conducted by one of the aides. The following facts were noted about the teaching:

(1) The aide used "brown" and "tan" as synonyms in talking about colors. (2) She did not correct children who confused the left and right sides of the BRL book. (3) She did not stop fighting which occurred during the lesson. (4) Both the aides and the children's concentration on the material was impaired by the continuous annoyance caused by gnats in the classroom.

The third evaluation visit was made on July 23, 1971 and lasted one hour. Mrs. Smith used the BRL materials for 25 minutes with all the children in a single group (N=22). Mrs. Smith had not read the BRL materials prior to conducting the lesson. The materials had been assigned to one of the AATS interns who did not arrive on this day. Mrs. Smith spent most of the time having the children respond to questions associated with such concepts as left-right, first-last, middle, more than, squares, circles, and color mixing. Two major disadvantages were noted in the use of the BRL program with a single large group: 1) Many of the children on the periphery of the group did not become involved with the material. (2) Due to the large size of the group it was difficult for Mrs. to correct those children who responded incorrectly to her questions.

Use of the BRL materials at M. A. Jones appeared to be somewhat flexible. The specific instructional techniques used (small groups, large groups, etc.) fluctuated as a function of attendance, outside activities, and the teacher's perception of how well the children were progressing. Mrs. Smith seemed to have some anxiety about the pre and post testing of the children on the BRL material. Although assured by the evaluator that the tests were to be used only to evaluate the BRL program itself, she persisted in wanting to know the nature of specific test items. Upon receiving information from the evaluator that the test was generally concerned with animal names, colors and such, she proceeded to spend time teaching just those items to the children. This probably did not inflate the pupils' performance scores, since Mrs. Smith was never given a copy of the test until the end of the Pre-K program. Still it indicates some of the difficulties one encounters in trying to obtain reliable information about programs used in a public school setting.

Luckie. The Pre-K class at this school was under the direction of Mrs. Carnes and her co-teacher Mrs. Bell. In addition to these two teachers a health aide was normally present. Volunteer workers also helped the two teachers in several of the tasks associated with conducting the class (e.g. story telling, preparing snacks, assisting on field trips). During the first weeks of the Pre-K program at Luckie a teen-age boy worked with the children. He provided a role model for the boys to follow. He also helped the teachers by shepherding the boys to wash their hands,etc.

It is difficult to assess the actual attendance figures for the Luckie Pre-K class. Mrs. Carnes turned in two separate attendance forms to the Laboratory for Applied Behavior Research. These forms conflicted with one another with respect to how many children were actually enrolled in the program. A conservative estimate would be that twenty-seven children entered the program. Twenty-one of them completed more than 15 days in the program.

The first evaluation visit to Luckie was made on July 1, 1971. On this date there were 19 children present. All of the children were exposed to the BRL materials, either by Mrs. Carnes or by Mrs. Bell. The procedure was for the children to be divided up into several small groups (N=23 in each group.) Each group was then exposed to the BRL program for a short time. The amount of time spent on the BRL material appeared to be a function of the individual child's attention span (i.e. children were allowed to leave their BRL group if they became bored or restless. These children engaged in other activities such as free play or art). An average session seemed to run about 10 minutes. Mrs. Carnes and Mrs. Bell reported that they were using the BRL program every day with the children. They were rotating the children in such a fashion that each teacher saw each child over the course of several days instruction.

The second evaluation visit was made on July 12, 1971. Fourteen children were present. Mrs. Carnes and Mrs. Bell had developed a mimeographed form for keeping each child's BRL progress. This form, which provided a record of the number of pages a child had covered in the BRL book, was used in building the small groups for each BRL lesson. In addition to the use of a record form, Mrs. Carnes and Mrs. Bell had decided to permanently divide the children for the purposes of BRL instruction. Mrs. Carnes always worked with the same groups of children, as did Mrs. Bell. This procedure allowed the two teachers to give more personel attention to their respective children.

The third evaluation visit was made on July 23, 1971 and lasted one hour. Nine children were present on this date. Mrs. Carnes and Mrs. Bell continued to use those procedures which had been instituted by the time of the second evaluation visit. They seemed to have some difficulty in teaching the children to reliably discriminate red from orange in the BRL book. They were forced to rely on objects in the room, rather than the book, to teach the differences. This difficulty could be resolved by using a more saturated red in printing the BRL book.

Mrs. Carnes and Mrs. Bell appeared to work very well together throughout the Pre-K program. Their approach to the use of the BRL materials was rather innovative. The major drawback associated with their use of the BRL program seemed to be not so much with the teachers as with the population of students with whom they were dealing. The children at Luckie seemed, to the evaluator, to appear and disappear from the classroom with astonishing rapidity. This fluctuation in attendance made the use of the BRL materials rather difficult.

Slater. The Pre-K class at this school was conducted by Mrs. Evans, assistance in running the class was provided by AATES interns, aides, and NYC workers. The total enrollment at Slater was thirty-two children. Twenty-eight children attended for more than fifteen days. Due to time constraints only two evaluation visits were made to Slater.

The first evaluation visit was made to Slater on July 8, 1971. Twenty-five children were present. Mrs. Evans had divided her children up into three rather large groups (N=10-11 in each group). These groups were exposed separately to the BRL material for approximately 15 minutes each day. On the day of the evaluation visit, however, all the children were given their BRL lesson together (Mrs. Evans had told the evaluator previously that she thought it possible to use the BRL with large groups.)

The second evaluation visit was made on July 19, 1971. Twenty-three children were present. By this date Mrs. Evans was using the BRL materials with the total group, only to review those parts of the program that the children had been exposed to in smaller groups. Mrs. Evans reported that her major emphasis in using the BRL program was to work with those children who would definitely be attending Slater in the fall of 1971.

These returning children (N=11) were placed together in one of the three groups, and consistently exposed to the BRL program. The other two groups of children were treated in a somewhat more cursory fashion in terms of their contact with the program (i.e. the evaluator got the subjective impression that there was less concern with the children's understanding of the BRL program in the two groups of non-returning students, than in the group of returning students).

Williams. The Pre-K class conducted at Williams did not use the BRL program. Instead, the children at this school were exposed to a variety of educational experiences designed to teach the alphabet, color discrimination, etc. These children were used to provide a control condition for the schools in which the BRL program was used.

The Pre-K program at Williams was under the direction of Miss Timms. Miss Timms was absent for 10 days during the six weeks. The class was conducted by Mrs. Owen in her absence. Miss Timms and Mrs. Owen were assisted by AATES interns, aides, volunteers, and NYC workers in running the class. Thirty-four children were enrolled in the Pre-K program at Williams. Of these thirty-four, twenty-three attended for more than 15 days.

The first evaluation visit to Williams was made on July 17, 1971. Twenty-two children were present. The evaluator's main impression was that the classroom had an intolerably high noise level. The noise stemmed primarily from the fact that no control seemed to be exercised over children who banged on the piano, screamed, banged blocks together, etc. A variety of activities (e.g. listening station, art, blocks, cooking) were continuously available to the children. Each child could choose to participate in as many of the activities as he wished. The length of participation was determined by the child himself. Children often moved from activities such as the listening station after as little as five minutes. This short exposure time, coupled with the noise level in the room, seemed to preclude any sort of lasting academic learning experiences.

The second visit to Williams was made on July 20, 1971. Twenty-one children were present. The noise level in the class had been reduced somewhat through rearrangement of the room's furnishings. This new arrangement served to divide the room into specific areas for the activities of cooking and baking, housekeeping, art, television and listening station, and a play area with a reading corner. The noise reduction achieved was from the new physical arrangement not from any controls instituted over the childrens' behavior. The children still were allowed to choose both the activities they engaged in and the length of time they participated.

The Results of Using the BRL-Sullivan Program in Prekindergarten Classes

In order to assess any benefits associated with the use of the BRL program in Pre-K classes, pre and post tests were administered to the children at Grant Park Primary, Jones, Luckie, Slater, and Williams. The test used was developed by the staff of the Laboratory for Applied Behavior Research and is based upon the Skills and Concept Survey kit marketed by Behavior Research Laboratory. The test instrument is appended to this report. Use of the test involves asking an individual child questions about items on two stimulus cards. The questions are designed to determine whether the child: can name 8 colors; can discriminate left from right; can count up to four; can distinguish letters from pictures and numbers; can name animals and letters; and can follow simple instructions using the concepts of first, middle, top, and bottom.

Pre-test at each of the four BRL schools and at Williams was done during the last week of the program, from July 26 to July 29, 1971. Care was taken to insure that the pre and post test situations were as similar to one another as possible. Thus, each child was tested in the same place at his school on each of the two test occasions. Additionally, the testers made sure that as many children as possible had the same tester for the two test administrations. (It was not always possible to hold to this latter constraint. However, approximately 80% of the children tested did have the same tester on both testing occasions).

One hundred and forty-six children were enrolled in the five schools associated with the BRL program. Of these children, one hundred and thirteen were present at least fifteen days. Complete pre and post test results were obtained for seventy-five children (N=9 at Grant Park, 19 at Jones, 13 at Luckie, 19 at Slater, and 15 at Williams).

The discrepancy between the number of children enrolled and the number of children tested was due to two major factors. First, several children enrolled after the initial week of the program and thus were not present for pre-testing. Secondly, vacations, withdrawals, and absenteeism reduced the number of children present at the time the post-test was administered.

A raw score for each of the seventy-five children was obtained by subtracting the number of correct answers the child gave on the pre-test from the number of correct answers he gave on the post-test. (No child made a perfect score of 37 correct on the pre-test. Thus the raw score for each child could have been either positive or negative.) The raw scores indicate the difference between each child's performance on the two testing occasions. The raw scores are from an ordinal scale of unknown distribution and therefore are appropriately analyzed by nonparametric statistical procedures. Two separate analyses of the data were conducted. The first of these dealt with the extent to which the subjects within each of the five schools had changed from pre-test to post-test. The second set of analyses concerned comparisons between the three separate types of schools - BRL with behavior modification, BRL without behavior modification, and the control school.

Within School Analyses. The hypothesis associated with each of the schools was that the children would get more items correct on the post-test than the pre-test. This was a one-tailed hypothesis and was tested against the Null hypothesis that the children within each school would show no change from pre-test to post-test, or that the change would be negative (i.e. more correct items on the pre-test than on the post-test).

The Wilcoxon Signed Ranks test[3] was employed in testing the two hypotheses against one another for each school. The results of these analyses are reported in Table 1. Inspection of this Table reveals that the children in Grant Park Primary, where the BRL program was used in conjunction with behavior modification techniques, did significantly better on the post-test than they had on the pre-test. Children at

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[3]Sidney Siegel. Nonparametric Statistics for the Behavioral Sciences. McGraw-Hill: New York, 1956. pp. 75-83.

Luckie, Jones, and Slater schools (where the BRL program without behavior modification was employed), also improved significantly from pretest to posttest.

The only school that did not show a significant increase across the two testing sessions was Williams. It will be recalled that the children at Williams were not exposed to any systematic reading program, including the BRL.

Between School Analyses. The within schools comparisons establish that the BRL program, both with and without behavior modification, leads to a significant increase in test scores. The question now arises as to whether the increase is greater in Grant Park, where behavior modification was used, than in the three schools that used the BRL program without behavior modification. In order to answer this question the scores for the students at Jones (N=19), Luckie (N=13), and Slater (N=19), schools were combined to form a class of children who had been exposed to the BRL program without behavior modification (BRL alone group). Scores for the Grant Park children were then compared with those of the BRL alone group to test the hypothesis that the children at Grant Park had increased their test scores more than had the children in the BRL alone group.

A single-tailed Mann-Whitney U test[4] was used to compare the children at Grant Park to the children in the BRL alone group. The scores for the nine children at Grant Park and 51 children in the BRL alone group were ranked together. From the rankings a U value of 142 was calculated. This is equivalent to a z value of 1.81 which is significant at the .03 level (one tailed). This indicates that the BRL Program with behavior modification increased test scores more than did the BRL without behavior modification. (The alternative interpretation that the BRL alone group was initially different from the Grant Park group may safely be eliminated, since a comparison of the pretest scores for the two groups showed no significant difference between them.)

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[4] Ibid. pp. 116-127.

The children at Grant Park were divided into two groups, one of which actually worked with the BRL program (N=6), while the other was exposed to behavioral techniques designed specifically to teach the stated objectives of the BRL program (N=3). The scores for these two groups were combined in comparing Grant Park to the BRL alone group. Thus, the penultimate sentence in the preceding paragraph is not strictly correct in attributing the significantly greater increase at Grant Park to the BRL with behavior modification.

It may have been the case that the Grant Park group that used behavior modification alone was superior to the group that used the BRL in conjunction with behavioral techniques. The small number of students in the two groups at Grant Park do not permit the resolution of this point; however, since the Laboratory for Applied Behavior Research will conduct a full scale study during the 1971-72 school year in the Atlanta Public Schools it should be possible to answer the question at a later date.

In addition to the comparison between the Grant Park children and those in the BRL alone group, both of these groups were compared to the control group (N=15) at Williams. The Mann-Whitney U test was used in making these comparisons. Both the Grant Park group and the BRL alone group showed significantly greater increases from pretest to posttest than did the control group at Williams. The U value for the comparison of the Grant Park group to the control group was 25, a value that is significant at the .01 level. The comparison of the BRL alone group to the Williams group yielded a U value of 144.5. This value is significant at the .001 level. (Again, to eliminate the suggestion that these groups may have been initially different from one another, the Mann-Whitney U test was used to discover whether the pretest scores for the three groups differed significantly from one another. The results of using this test showed that the three groups did not have significantly different pretest scores).

The BRL-Sullivan Program in Prekindergarten

The BRL program used in the Pre-K classes during the summer of 1971 appeared to be a useful tool in teaching basic pre-reading skills to the

children with whom it was used. The subjective impression of the evaluator was that the BRL program was easy to use and held the children's attention for reasonable periods of time. Additionally, the pretest and posttest data showed that those children exposed to the BRL program did significantly better when tested than did those children who were not exposed to the program.

In addition to the evaluation of the BRL program conducted by the Laboratory for Applied Behavior Research, the teachers who used the BRL program were asked to respond to a questionnaire about the program, the results of this questionnaire are shown in Table 2.

The teachers who used the BRL program were also asked to write recommendations based upon their experiences during the six week summer program. These recommendations are reproduced <u>exactly</u> as they were written:

<u>Recommendations for BRL</u>

1. We recommend that the Sullivan Kit be continued in the kindergarten and prekindergarten this fall, and be used next summer and the following fall because:
   a. Directions are very good and are sequential.
   b. Teachers and children enjoyed it.
   c. Lessons correlate with other subjects in teaching the basic skills.
2. We recommend that each school that use the BRL also use the enrichment kit.
3. We recommend that all kindergartens use some type of formal reading program.
4. Make "Red" <u>red</u> the color in the book is confusing with the color orange.
5. Let the testing people also work with the children.

THE PEABODY REBUS

Description of the Rebus Program

In 1965 a Rebus Reading Series was developed by Richard W. Woodcock as an experimental program for teaching reading to mentally retarded children. Out of this experimental series, the Peabody Rebus Reading Program (REBUS) was developed.

The present REBUS has been tested with a variety of subjects including kindergarten, Head Start, 1st grade, mentally retarded children, emotionally disturbed children, and with remedial readers. According to its authors,[5] the REBUS is primarily intended for use in kindergarten and 1st grade.

The rationale behind the REBUS is to first teach the child a vocabulary of symbols which are easier to learn than spelled words. After the basic reading skills have been acquired, spelled words are slowly faded in (i.e., substituted for the symbol). In behavioral terms, the REBUS attempts to reinforce the child for reading before he has acquired written language, thereby making the process of reading acquisition more interesting to the child.

The REBUS consists of 5 books; 3 programmed workbooks and 2 readers. Workbook 1 presents a vocabulary of 35 symbols. Short sentences are formed from these symbols. Workbook 2 extends the vocabulary to 68 symbols. It also introduces certain skills involving several consonant and vowel-consonant combinations. Workbook 3 extends comprehension skills and introduced phonic skills. Reader I extends the vocabulary to 120 symbols, 40 of which are transitioned into spelled words. Reader II extends the reading vocabulary to 172 symbols, 122 of which are spelled words.

The pre-kindergarten summer program was concerned mainly with Book I. Book I is divided into a series of frames, four to a page. There are two basic types of frames: those which require teacher involvement (frames

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[5]Richard W. Woodcock, Charlotte R. Clark, and Cornelia Oakes Davies. "Its Fun to Read With REBUS," American Guidance Services, Circle Pines, p. 6.

usually concerned with new symbols, new skills, or reviews) and those which are worked individually by the student. Frames are grouped into sections which begin with several "teacher involvement" frames, then proceed to several individually worked frames which end with a "Stop" sign.

The "Stop" sign signals the end of a section--the pupil then lets the teacher know he has finished, she checks his work and if she feels the pupil is doing well, she moves on to the next section of teacher involvement frames.

The pupils' responses are made by dipping the eraser end of a pencil into a "water-well" (a moderately wet sponge) and then wiping the eraser end across a lined response area beneath the chosen answer. If the child has chosen the correct answer, the lined area will turn green; if he has chosen the wrong answer, it will turn red.

The Rebus Program With Behavior Modification

Behavioral techniques were introduced in one class where the Peabody-Rebus Reading Program was to be used. This prekindergarten class was at Edward S. Cook Elementary School and had an enrollment of 40 students, 36 of which were in class for more than 15 days. A total of 15 children were exposed to the Rebus at some time during the 6 week session. The teacher did not feel that the remaining students exhibited the necessary social, as well as academic, skills to perform on the REBUS.

The strategy in this class was to allow the teacher, Mrs. Sally Jackson, to run the program her own ways and the consultant would implement techniques of behavior modification where he saw fit. The teacher was in complete agreement with this strategy. Following is a chronological description of the introduction of behavior techniques in the classroom. Refer to Table 3 for a diagram of these intervention.

On June 28, Group I (5 children chosen by Mrs. Jackson as being the most mature) was introduced to Book One. The teacher asked the children to "read" (collectively) the symbols in frame 1. The children were also allowed to look through the book.

On the following day the children were again asked to "read" symbols in frame 1. The consultant suggested that this be done individually in order to make certain that all 5 children could read the symbols. The children were then asked to point to the large symbol in each subsequent frame in this section and to find the answer with their finger. Some pupils needed help with this, as they did not seem to understand the concept of matching. Pencils and "water-wells" were then passed out. The teacher explained how the items were to be answered and that "green means correct" and "red means incorrect". Mrs. Jackson went through each frame with the children and had them first point to the correct answer with their finger and after making sure each child had the right answer, the pupils were allowed to mark the correct answer. The above procedures were quite tedious because 1) some children seemed to have difficulty understanding the concept of matching; 2) it was difficult to keep the children attending to the task; 3) some children seemed to lack enough confidence to make a decision by themselves; and 4) quite often a child would mark both answers just to see the colors appear.

Another group of 5 pupils (Group II) was also begun on this day. These children were introduced to the book and were asked to read (both collectively and individually) the symbols in frame 1.

On June 30, Group II was seen first and they worked through the first section (frame 1-8) in the same manner as Group I. However, this time it was suggested that the teacher explain that "green is good" and "red is bad" since these children had probably had more experience with the terms "good" and "bad" than with "correct" and "incorrect".

After helping the students with frames 9 and 10 (teacher involvement frames) the children were allowed to work on the second section (frames 11-19) by themselves. The teacher helped only in turning pages and in putting a child on the correct frame. The percent of items correct on this section for these pupils was: 88%, 11%, 0%, and 0%.

Group I was brought together later in the day for work on the REBUS Program. Since Group II had not done well on individually worked frames, the teacher helped each child in Group I find the correct answer for frames 11-19. Subsequently, all children performed at a 100% correct level.

The suggestion was then made to Mrs. Jackson that "Froot Loops" (a sugar-coated fruit flavored cereal) be given to those student who made no errors in a particular section. It was also suggested that she shape her students' behavior by giving "Froot Loops" for correct answers during the "teacher involvement" frames. The purpose of this intervention was: 1) reduce the reinforcement in marking a wrong answer simply to see the "magic" colors appear and 2) motivate the children to attend to the task and seek the right answer before marking.

On the following day, July 1, only Group II worked on the REBUS program. (The teacher had many other activities planned and there was no time for Group I to work on REBUS).

Mrs. Jackson explained to Group II that they could earn "Froot-Loops" by getting only green in their workbooks. She then helped the children with the "teacher involvement" frames before letting them work alone on the "individually worked" frames. However, the teacher failed to implement the suggestion of shaping the children's behavior by reinforcing them (with Froot-Loops") when they answered correctly on "teacher involvement" frames. The consultant did not remind her of this at this time.

After going through the "teacher involvement" frames, Mrs. Jackson asked the students to go through frames 25-50 (individually worked frames) without pencils and point to the correct answers. Help was given to those who needed it. Pencils and water-wells were then handed out and, after reminding them about the "Froot-Loops", the children were instructed to work by themselves until reaching the Stop sign. Two students were still marking both answers in each frame. After a few frames, the teacher gave them extra help for the rest of the section. (It was later decided that these two children should be dropped from the REBUS program in order to give them special training which would enable them to do the REBUS. In order to make it easier on the teacher, a child from Group I was moved to Group II, making 4 children in each group.) The 2 children who worked individually performed at a 80% and 96% correct level.

On the following day, the teacher instated the reinforcement program ("Froot-Loops") with Group I in much the same manner as with Group II, however, this time she reinforced correct answers on the "teacher involvement" frames with "Froot-Loops". These children were also asked to go through frames 25-50 without pencils at first. Only one child had trouble with this and he was given help. The other children worked individually withtheir dampened pencils and performed at the following levels: 100%, 96%, and 92% correct.

On the following day, (July 5) the suggestion was made that students who made no errors would continue to receive several Froot-Loops, but those missed only one would get 1 Froot-Loop. Those who missed more than one would not get any Froot-Loops. This suggestion was made after observing that when a child missed one item, his attention toward the task was greatly reduced, probably because the child realized he could not get any Froot-Loops. It was felt that differential reinforcement might remedy this.

On the first day that the above changes were made, the teacher did not carry out the instructions in a smooth manner and the children seemed confused. Another factor which added to the confusion was the fact that a new skill was required of the students in this section of the book: not only did they have to match objects, but they had to match color and object. For example, the stimulus item may be a "blue box." The responses to chose from are: "yellow box," "blue box," and "blue bird." The child has to consider both color and object in order to arrive at the correct answer. The students in both groups performed poorly on this section: 95% (with help), 79% (with help), 79%, 79%, 79%, and 68%. (Two children were absent and performed on this section at a later date under a token reinforcement procedure. These 2 children made 89% and 79% correct.)

On the next school day the following instructions were given to Mrs. Jackson on a 5 x 8 card in order to help her run through the lessons more smoothly:

1. Go through items having yellow circles with children.
   a. "Good, good job" if child gets green (+Froot-Loop)
   b. "Not good, wrong..." if child gets red (no Froot-Loops)
2. Mark time on one book when children begin "individually" worked item
3. Mark time in each book when child reaches "Stop" sign and raises hand.
4. Look over child's work
   a. all correct=5 Froot-Loops
   b. all but one correct=1 Froot-Loop
   c. More than 1 missed = no Froot Loops

d. More than 3 missed = send child to another section of room with aide for review of material (a check mark should be made under asterisk column of Progress Report).
e. Upon completion of daily Rebus program, children who have done good work should be praised and allowed to leave room. Children who have not performed well (missed more than 3) should remain in room for further review.

Another change was also made. Cover sheets (heavy typing paper) were attached to the right hand page of the next 3 sections with small amounts of glue. This was done in order to help the child begin on the left page. When a child completed the left page, he could then tear off the cover sheet and begin working on the right page. (This procedure worked well, but the teacher still had to help some students begin at the top and work down).

The above procedures were used for the next 7 school days. Some days were used as review days. The percent correct over these seven days was as follows:

		FRAMES 103-115	FRAMES 120-139	FRAMES 145-178
GROUP I	S_1	100%	100%	95%
	S_2	79%	100% (with help)	100%
	S_3	79%	absent*	absent*
	S_4	68	100 (with help)	100 (with help)
GROUP II	S_1	89 (with help)	85	95
	S_2	79	92	95
	S_3	74	85	absent*
	S_4	79	92	100

*these sections were done later under a token reinforcement procedure.

A new group (six students) was begun during these seven days. However, the group was disbanded because it was felt that they lacked the prerequisite skills which would enable them to perform on the REBUS material.

It was decided that these six children, along with the 2 children who were taken out of Group II, be put in a special group where these prerequisite skills could be taught. A behavior modification project using a multiple baseline across behaviors[6] was designed to teach the following skills:

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[6]Donald M. Baer, Montrose M. Wolf, and Todd R. Risley. "Some Current Dimensions of Applied Behavior Analysis," Journal of Applied Behavior Analysis, 1968, Vol. 1, No. 1, p. 91.

1) distinguish red from green, over from under, small from large, and top from bottom.

2) understand the meaning of first, second, third.

At this time a volunteer with both teaching experience and experience in behavioral engineering was sent to Cook by Dr. T. Ayllon. Mrs. Jackson decided to let the volunteer and the consultant conduct the REBUS program since the teacher was more interested in doing other things. The consultant agreed to this even though it meant giving up the behavior modification project with the special group. The AATS interns were asked to teach the above mentioned skills to this group in any manner they chose.

On July 16 a token reinforcement program was begun with the REBUS groups. Green tickets were given for each frame in which a child got only a green "answer". These tickets could be exchanged, as soon as the child reached the STOP sign, for candy and trinkets. It was also decided at this time that students should no longer get help on "individually worked" frames because extra help was becoming too reinforcing. Since the children were allowed to do poorly on some days and were not given help, a comparison of percent correct before and after the advent of token reinforcement is not practical. However, subjective observations made by the consultant show that the students attended to the task and seemed to be more motivated to perform well after tokens were in use than before. The token reinforcement program was used for the remainder of the summer program.

After about three weeks in the special group, the AATS interns felt that 4 of their students were ready to begin REBUS. Therefore, a new group was started. After one session with this group, it was decided that one member was yet not ready for REBUS, since he did not seem to understand the concept of matching. He was sent back to the special group.

Token reinforcement was used with the other three children and they performed at a fairly high percent correct level:

	sec 1	sec 2	sec 3
s_1	(67)*	88%	not done
s_2	(44)*	(100% with help	*100%)
s_3	89%	65%	not done

*these sections were done previously when Group III was first begun.

As with the BRL program, a Between group analysis will be discussed later concerning the REBUS with and without behavior modification. Following is a description of the REBUS classrooms where behavior modification was not used.

The Peabody-Rebus without Behavior Modification

The Rebus Reading program was used not only at Cook but also in the Harris, Pitts, and Ware Pre-K classes. As was the case with the BRL program, the teachers at these latter schools were not given any specific instructions about using the Rebus program in their individual classrooms.

The use of the Rebus program without behavior modification at Harris, Pitts, and Ware was evaluated in the same fashion as was the use of the BRL program without behavior modification at Jones, Luckie, and Slater: an evaluator paid randomly scheduled, unannounced visits to each school. Approximately three hours were spent at each school during each evaluation visit.

Harris. The Pre-K program at Harris was directed by Miss Keller. She was assisted by both aides and volunteers in conducting classroom activities. Thirty-four children were enrolled in the Harris Pre-K class. Of these students, thirty-three attended for more than fifteen days.

The first evaluation visit was made on Tuesday, June 29, 1971. Miss Keller had decided to conduct the Rebus program on Mondays, Wednesdays, and Fridays, thus no actual observation of the program's use was made during this visit. Miss Keller had selected eight children for initial participation in the Rebus program. The criterion for her selection appeared to be her subjective evaluation of the child's ability to work independently.

The second evaluation visit was made on July 16, 1971. Fourteen children were present at the time of this visit. The children using the Rebus program were placed in a separate room away from any distractions. Two groups of children using the Rebus were observed. The first of these groups (N=2) was under the supervision of an aide. She initially used the supplementary Rebus cards to teach new symbols to the children. The children then received a brief review from the aide about marking the correct answer in each frame. Once the children were working in their books the aide gave individual help where it was needed. Most of her activity was directed toward pointing out missed frames and skipped pages. The children spent about fifteen minutes working in their books.

The second group of children using the Rebus (N=3) was under the supervision of Miss Keller. She started by having the children call out various symbols on the Rebus cards. Unfortunately, in correcting the children's response, Miss Keller consistently (and incorrectly) referred to the symbol representing "black" as the "black ball". This led the children to confuse color symbols with the ball symbol. The children in the second Rebus group spent approximately thirty-five minutes working on the program.

In both the two groups the children stopped working whenever the instructor was helping another child. This slowed down each child's working pace and effectively precluded the use of a rate measure for indexing the children's progress with the Rebus.

Pitts. The Pre-K class at this school was supervised by Miss Kahn. Two aides always assisted her in conducting class activities. Twenty-nine children were enrolled in the Pre-K class and twenty-two of them attended school for more than fifteen days.

The first evaluation visit to Pitts was made on July 2, 1971. Sixteen children were present. Due to involvement with a special activity (making apple sauce) the Rebus was not conducted. Miss Kahn reported that the Rebus was normally used everyday except on those days when field trips were taken. She said that seven children were currently using the Rebus materials and she planned to begin use of the program with other children on July 6, 1971. She commented on the fact that the children seemed to have difficulty with the concept of a frame and that there was a tendency to confuse the Rebus symbols with one another. To facilitate learning the skills necessary for using the Rebus, Miss Kahn and reproduced pages from the Rebus book on Flip charts. These large charts were then used to teach the children how to mark answers, recognize frames, etc.

The second evaluation visit was made on July 13, 1971. Twenty-two children were present. Five children were observed while they used the Rebus program. Of these five children, two (a six year old girl and a girl who had attended Pre-K previously) could work independently. The other children needed continuous supervision in working with their books.

Miss Kahn spent about ten minutes working with the children as a group. She used the Rebus cards to teach new words, review old words, build simple sentences for reading, and build "fill in the blank" sentences for the children to work in their individual books.

Three major facts were noted by the evaluator during the second visit to Pitts. The first of these was that the children had great difficulty in reading sentences which had color symbols in them. This may have been due to the fact that the color symbols in the Rebus program were so easily recognized and verbalized that they interfered with the recognition of less meaningful symbols. Second, there was a tendency on the part of the children to always start on the right hand page of their workbooks. They could not learn to start on the left hand page and usually had to be instructed by Miss Kahn to do so. Third, Miss Kahn had instituted gross reinforcement procedures for rewarding children who successfully completed a Rebus section. She gave each child who completed his work a marshmallow. The children seemed to expect the marshmallow no matter how long they took to do a section in their books. The children spent an average of twenty minutes working with the program, although one boy was still working on his book when a fire drill necessitated his stopping.

The third evaluation visit was made on July 21, 1971. Fifteen children were present. One of the two children who could work without supervision had been absent and had just returned to class. Miss Kahn was forced to work with this girl alone, teaching her new words that the other children had learned already. This reduced the amount of time that could be spent with those children who were not so far advanced in the Rebus book. All told, five children worked in their Rebus books. The average time spent was about ten minutes.

Ware. Miss Schwartz directed the Pre-K class at Ware. She was assisted by Aides, volunteers, AATS Interns, and NYC workers. Thirty children were enrolled in the Pre-K program. Of these children, twenty seven attended class more than fifteen days.

The first evaluation visit to Ware was made on June 30, 1971. Miss Schwartz had selected nine children to participate in the Rebus program. Eight of these children were present and were observed using the Rebus. The children were seated on the floor in a circle. Miss Schwartz asked the children, as a group, to name several of the large Rebus pictures. The individual children then named the small Rebus cards and matched them with the pictures.(Not all the children participated in this activity.) Next, Miss Schwartz held a brief review of how to mark the answers in the Rebus book since the children did not seem to understand what action they were to take if they chose an incorrect answer. Miss Schwartz then had them work, under her supervision, on their own. The children spent about ten minutes in their books.

The second evaluation visit was made on July 9, 1971. No Rebus activity was conducted on that date due to the visit of the school doctor. The children worked under the close supervision of Miss Schwartz, who turned pages for them, pointed out skipped frames, and asked them leading questions about their answers. She also kept up a running stream of verbal reinforcement for their performances. The five children read their Rebus books aloud. This generated a great deal of confusion and, coupled with Miss Schwartz's comments, produced a noise level altogether too high for effective work. In addition to the children working with Miss Schwartz,two other children received individual instruction from an aide and an NYC worker. One of these children simply worked in her book under continuous supervision, while the other was given a review of previous materials. The average total time spent on the Rebus by all the children in both groups was fifteen minutes.

The Results of Using the Peabody-Rebus Program in Prekindergarten Classes

Table 4 gives the percent of students at each school who were exposed to each section of the REBUS, Book I. A total of 54 children in the Pre-Kindergarten Summer Program were exposed to the REBUS, (42% of all the children enrolled in schools where the REBUS was used). Out of these 54 students, 40 &74%(finished at least 1/3 of Book I; 13 (24%) finished at least 2/3 of Book I; and 3 (6%) finished Book I.

A continuous measure of progress is possible with the REBUS because it is individualized and because the children progress through the book by "answering" frames. For this reason, a pre-post test was not necessary in comparing the Rebus with behavior modification to the REBUS without behavior modification.

Teachers using the REBUS program were asked to record rate data (i.e. number of frames completed per minute) on their students by timing them on each section of "individually worked" frames. From this data, rate correct and rate incorrect can be computed. This type of data is a more accurate description of behavior than is percent data, i.e. a child who marks 5 correct frames per minute is performing at a different level than one who marks 1 correct per minute even though the percent correct may be the same for both students. Also, certain analyses are possible with rate data that are not possible with percent data. For example, when both rate correct and rate incorrect are high, the child is working too rapidly.

Periodic observation at the schools showed that rate data were in many cases invalid because the teacher would often interrupt the students, thus affecting their rates. It was also noticed that when the teacher was correcting the work of one student, the other students would stop working and watch. It was therefore decided that percent correct data (not rate data) should be used in any quantitative analysis of performance on the REBUS.

To further aid in the analysis of the REBUS, the teachers were asked to mark, on progress reports provided, those sections in the REBUS where the child received help during "individually worked" frames. This was done in order that these data could be omitted when comparing the performance of children at one school with those of another. However, there is reason to believe that teachers in fact did not always report the times when help was given. At Cook, children received help on 30 occasions out of 108. At Ware, only 5 sections out of 116 were marked as "help given". At Harris, 19 sections out of 77 were marked as "help given". Help was never given at Pitts, according to the Progress Report. In addition to these discrepancies, incongruities were found between observations made by an evaluator and the Progress Reports filed by the teachers.

An analysis of the percent correct data excluding the "help given" sections shows that the scores for children at Cook (where behavior modification was used) were significantly higher than those at Harris ($t=2.7917$, with 18 df; $p < .01$, one tailed)* but do not differ from those at the other three schools combined.

Because of the discrepancy in the reporting of help given on certain sections, it was decided that an analysis should be done on the percent correct scores including the help given scores. When these data were included, the percent correct scores at Cook (Rebus with behavior modification were significantly higher than those at the other three schools combined ($t=2.7310$, with 52 df; $p < .01$, one tailed) where only the Rebus material was used.

There are two factors which could account for these results: 1) the help given at Cook could have influenced the scores more than the help given at the other schools, 2) the behavior modification techniques used at Cook had the effect of producing higher scores. The fact that percent correct scores excluding "help given" scores are significantly higher at Cook than at Harris (the only school where the percent of "help given" information was near that of Cook) lends strength to the second hypothesis.

*all statistic tests dealing with percents used the following transform: $p^{\frac{1}{2}}=2 \arcsin p$; where $p^{\frac{1}{2}}$= percent score.

The Rebus in Prekindergarten

This section will deal with the usefulness of the REBUS in a pre-kindergarten Summer Program. It should be kept in mind that the comments made in this section refer to the population of 4 year old children seen in this summer's program. We do not wish to generalize, in the absence of data, to all 4 year old children.

An important consideration in evaluating a programmed instructional material, such as the REBUS, is error rate. A low frequency of errors is necessary if a behavior, in this case reading, is to be acquired. Acquisition occurs when the behavior is reinforced by correct answers.

The average percent incorrect across students in all REBUS classes was 21%. Only 4 children exhibited a frequency of errors below 10%. Eight children exhibited a frequency of errors above 30%. It is felt that this frequency of errors is too great for the REBUS program to be useful.

The reason for the high frequency of errors probably lies in the prerequisite skills which are necessary for performance on the REBUS. Some of these skills, as mentioned before, are: matching, working left to right and top to bottom, understanding the concepts of first, over, under. Attention span also seems to be a problem associated with this population of children.

The teachers using the REBUS program were asked to answer a questionnaire at a post-service meeting held on August 3, 1971, which dealt with their subjective evaluation of the REBUS program. The results may be found in Table 5.

The REBUS teachers were also asked to meet and prepare a list of recommendations concerning the REBUS program. These recommendations are reproduced here without comment.

1. Children need more readiness and time to develop certain basic skills and understandings before they can successfully use workbooks.
2. Instructions and terms aren't clear to children.
3. More practice sheets are needed.
4. Lessons are too long for most children's attention spans.

5. The program takes a great deal of the teachers time.
6. It takes too long before children can work independently, follow order of frames, go on from page to page without teachers help.
7. This material doesn't seem particularly suited for deprived or disadvantaged children.
8. All that we have read and been taught has stressed the importance of pre-school children learning in an unstructured, informal situation. We feel that this program contradicts our beliefs concerning the instruction of pre-school children.

Summary and Conclusions

It is not possible to compare the BRL and Rebus programs with one another in terms of a set of objective criteria that could be equally applied to both programs. The BRL program is essentially a group oriented program that requires the teacher to be present whenever it is used. It provides no means for continually assessing a child's progress. The Rebus, on the other hand, is used individually by each student and theoretically can be used without the teacher's direct supervision. The Rebus also provides a means of continually recording an individual child's performance.

If one were forced to choose between the two programs for use with a Pre-Kindergarten class similar to those encountered this summer, the program chosen should be the BRL. The BRL program does not demand that the children using it have complex behaviors (such as frame marking and matching) already in their repetoire. Additionally, the BRL program in the Pre-K classes can be used repeatedly. With all children. while the REBUS cannot.

It should be pointed out that there is a potential alternative to either the REBUS or the BRL programs. This alternative consists of using behavioral techniques to teach specific skills and concepts necessary for reading. Although the Summer Pre-K project was not sufficiently large to permit a quantitative investigation of this method, the data obtained seemed to indicate that behavioral techniques were effective in teaching pre-reading skills. Additional evidence for the effectiveness of behavioral techniques may be seen from the fact that some of the Pre-K teachers spontaneously used operant principles in their classes, even though they had no contact with the consultants from the Laboratory for Applied Behavior Research. Some of the techniques developed by these teachers are listed below:

1. Reinforcement of appropriate behavior

—at Ware balloons and candy were made contingent upon performance of specific activities (language motto, painting, puzzels, REBUS, etc.) and good verbal description of those activities to the teacher.

—Marshmallows were made contingent upon completion of a set of "REBUS" frames at Pitts.

2. Use of discriminative stimuli

—Various piano notes signaled the beginning of specific activities at Luckie.

—A bell was used at Williams as a signal for assembly and clean-up.

3. Use of competing responses to prevent unwanted behavior

—Having children tiptoe from classroom to another building where a film was to be shown precluded running and to a certain extent talking at Harris.

4. Satiation

—At Harris, demonstrating the projector and allowing the children to touch the film prior to the movie caused the children to pay more attention to content of movie and less to the workings of the projector.

5. Shaping

—When the doctor came to Ware, the teacher reduced anxiety by having the children use the stethescope on one another and having them "check" each others fingers in a simulation of the hematocrit test.

6. Verbal modeling of behavior

—When children at Pitts were to make an apple out of paper, the teacher described the process in detail and then had the children repeat the instructions as a group using a "fill-in-the-blank" technique, e.g. "cut the apple out of the ___paper. (red)."

All of these procedures are adaptable to other primary classrooms and can be carried out successfully by paraprofessionals.

APPENDIX

TABLE 1

Within School Change From Pretest To Posttest
For Those Schools Associated With The BRL Program

School	N*	Direction of Change	T	P
Grant Park	9	Increase	3.0	$<.01$
Jones, J. M.	18	Increase	2.5	$<.005$
Luckie	12	Increase	6.0	$<.005$
Slater	18	Increase	0.0	$<.005$
Williams	14	Increase	3.8	-**

* The Wilcoxon Test does not use individual scores of zero. Those students at each school who made the same score on the posttest as they did on the pretest were dropped from the analysis.

** Not Significant.

TABLE 2

Results of the Teacher Questionnaire
Dealing with the BRL Program

Agree	Not Sure	Disagree		
3		1	1.	The reading program used in my classroom was applicable to 4 year olds.
4			2.	The reading program used in my classroom required much of the teachers time.
4			3.	I feel that the children enjoyed working on the reading program.
1		3	4.	If I had the choice, I would not use the reading program again in a six week program.
4			5.	The particular reading program used in my class should be continued with the same children this fall when they begin kindergarten.
4			6.	The material presented in the reading program was useful in preparing the children for kindergarten.
1		3	7.	The reading program was more important than anything else I did in preparing the children for kindergarten.
2	1	1	8.	I could have taught the same material that is presented in the reading program without having to use the program.
	1	3	9.	I could have done a better job of teaching the materia presented in the program without using the program.
2		2	10.	Absences from class were a great inconvenience as far as the reading program is concerned.

TABLE 3

Reinforcements

Date	Type of Reinforcement	Status of Groups	Other Information
6/28	None	Group I begun	
6/29	None	Group II begun	
6/30	None		Green = Good Red = Bad
7/01	Froot-Loops	2 Ss dropped from Group II	
7/02	Froot-Loops		
7/06	Froot-Loops		
7/07	Froot-Loops		5x8 Card and Cover Sheet
7/08	Froot-Loops		
7/09	Froot-Loops		
7/12	Froot-Loops	Group III begun	
7/13	Froot-Loops	Group III disbanded	
7/14	Froot-Loops	Special Group begun	Volunteer given responsibility of REBUS
7/15	Froot-Loops		
7/16	Tokens		
7/19	Tokens		
7/20	Tokens		
7/21	Tokens		
7/22	Tokens	Group III restarted	
7/23	Tokens		
7/26	Tokens		
7/27	Tokens		Last day with REBUS

TABLE 4

Per Cent of Students Exposed to Each
Section of REBUS Workbook I

Section	Per Cent of Students at Cook	Per Cent of Students at Harris	Per Cent of Students at Pitts	Per Cent of Students at Ware
1	38	30	41	50
2	35	30	41	50
3	28	30	41	50
4	23	30	38	47
5	20	27	31	43
6	20	16	14	43
7	20	14	7	40
8	20	14	7	33
9	18	5	7	30
10	10	5	7	17
11	10	5	7	3
12	8	0	0	3
13	8	0	0	3
14	8	0	0	3
15	5	0	0	3

TABLE 5

Results of the Teacher Questionnaire
Dealing with the REBUS Program

Agree	Not Sure	Disagree		
1	2	1	1.	The reading program used in my classroom was applicable to 4 year olds.
2	1	1	2.	The reading program used in my classroom required much of the teachers time.
4			3.	I feel that the children enjoyed working on the reading program.
3		1	4.	If I had the choice, I would not use the reading program again in a six week program.
0	2	2	5.	The particular reading program used in my class should be continued with the same children this fall when they begin kindergarten.
3		1	6.	The material presented in the reading program was useful in preparing the children for kindergarten.
		4	7.	The reading program was more important than anything else I did in preparing the children for kindergarten.
2	1	1	8.	I could have taught the same material that is presented in the reading program without having to use the program.
1	2	1	9.	I could have done a better job of teaching the material presented in the program without using the program.
1		3	10.	Absenses from class were a great inconvenience as far as the reading program is concerned.

TEST INSTRUMENT USED WITH THE BRL PROGRAM

SULLIVAN SKILLS AND CONCEPT SURVEY
(: CORRECT RESPONSE)

1

SCHOOL _____
CHILD _____
AGE _____

CARD ONE

		TEST 1 DATE:	TEST 2 DATE:	
1. Point to the top of the card.	1			
2, Point to the bottom of the card.	2			
3. Show me the line that goes down the middle of the card.	3			
4. Show me your right hand.	4			
5. Show me your left hand.	5			
6. Point to the left side of the card.	6			
7. Do you see more than one square on the left side of the card?(yes)	7			
8. How many do you see? (2)	8			
9. How many circles do you see on the right side of the card? (4)	9			
10. Point to the first color in the top row.	10			
11. (POINT) What is the name of the first color in the top row? (green)	11			
12.(POINT) What is the name of next color? (orange)	12			
13. (POINT) What is the name of the next color? (black)	13			
14. (POINT) What is the name of the next color? (red)	14			
15. Now, point to the first color in the middle row.	15			
16. (POINT) What is the name of the first color in the middle row? (pink)	16			
17. (POINT) What is the name of the next color? (white)	17			
18. (POINT) What is the name of the next color? (blue)	18			
19. (POINT) What is the name of the next color? (brown or tan)	19			

CARD TWO:		TEST 1	TEST 2	2
Look at the top of the card				
20. Put your finger on the top left square.	20			
21. (POINT TO TOP LEFT) What is the name of that animal? (tiger)	21			
22. (POINT) What is the name of the next animal? (snake)	22			
23. (POINT) What is the name of the next animal? (fox)	23			
24. (POINT TO BOTTOM LEFT) What is the name of that animal? (bird)	24			
25. (POINT) What is the name of the next animal? (lion)	25			
26. (POINT) What is the name of the next animal? (giraffe)	26			
27. We have pictures and letters on this card. Point to some of the letters. (any letters will do)	27			
28. What letter is under the tiger? (a)	28			
29. What letter is over the giraffe? (b)	29			
30. What letter is over the bird? (a)	30			
31. What letter is under the lion? (c)	31			
32. What letter is under the fox? (b)	32			
33. What letter is over the lion? (c)	33			
34. What letter is under the giraffe? (d)	34			
35. What letter is under the snake? (c)	35			
36. Can you read the letters in the red box at the top of the card? Read them for me. (d, a, d)	36			
37. Those letters spell a word. Can you read the word? (DAD)	37			